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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/642,416	08/19/2000	Antonio Lain	60002639Z31	8230

22879 7590 05/05/2004

HEWLETT PACKARD COMPANY  
P O BOX 272400, 3404 E. HARMONY ROAD  
INTELLECTUAL PROPERTY ADMINISTRATION  
FORT COLLINS, CO 80527-2400

EXAMINER

LEE, TOMMY D

ART UNIT	PAPER NUMBER
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2624

DATE MAILED: 05/05/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/642,416

Applicant(s)

LAIN ET AL.

Examiner

Thomas D. Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11-15 and 17-28 is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,8-10,16 and 29-31 is/are rejected.
- 7) ☒ Claim(s) 3,6,7,32 and 33 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear as to which claim applicant's claim 16 depends from, since claim 16 is recited as depending from a following claim (claim 17).

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 2, 4 and 8-10 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,203,133 (Tanaka et al.).

Regarding claim 1, Tanaka et al. disclose a method for printing an image, said method comprising: for at least each colorimetric level that will be found in rendering the image, defining plural different superpixels (noting Figs. 5A – 5E, plural superpixels defined for colorimetric values 1-3, as well as single superpixels defined for colorimetric values 0 and 4 (column 6, lines 31-63)); generating or receiving data for the image (noting Fig. 4, corrected input data  $I'(x,y)$  obtained from input data  $I(x,y)$  and error data  $S(x,y)$  (column 5, lines 29-30)); rendering the image by a process that finds, for positions within the image: colorimetric levels (comparator 203 produces output pixel data  $O(x,y)$  equal to either 0, 1, 2, 3 or 4, based on comparison of corrected input data with four threshold values stored in threshold value constant memory 204 (column 5, lines 30-54)), and a randomized value corresponding to substantially each found colorimetric level (table memory 209 receives output data, selects pixel pattern corresponding to colorimeter value of output data (column 6, lines 15-24); selection of pixel pattern corresponding to each colorimetric value may be randomized (column 9, lines 26-29)); applying the randomized value to select a superpixel from the plural superpixels for each found colorimetric level (pixel pattern selected from patterns shown on Figs. 5A – 5e (column 6, lines 17-20)); and printing the image using the selected superpixels (corresponding signal output, stored as data corresponding to a 600 dpi print head (column 6, lines 22-24)).

Regarding claim 2, the superpixels defined for each available colorimetric level are all colorimetrically equivalent (noting Figs. 5B – 5D, superpixels B-1 – B-4 each comprise one ink dot corresponding to colorimetric value 1, superpixels C-1 – C-6 each comprise two ink dots corresponding to colorimetric value 2, superpixels D-1 – D-4 comprise three ink dots corresponding to colorimetric value 3).

Regarding claim 4, the rendering step operates in a computational space that has: one dimension for each colorant available (first dimension corresponds to colorimetric values); plus at least one dummy dimension which generates said randomized value (second dimension corresponds to pixel pattern selected from table memory 209, either sequentially (column 7, lines 34-43) or randomly (column 9, lines 26-29)).

Regarding claims 8 and 9, the rendering step operates by error diffusion (noting Fig. 4, halftoning processing section 114 includes error distributor 206, error distribution coefficient memory 207 and error diffusion matrix memory 208 (column 5, lines 4-9)).

Regarding claim 10, the image consists of color values in each of a large multiplicity of pixels (invention operable in monochromatic mode, multi-color mode or full-color mode (column 10, lines 38-47)); said positions comprise substantially each pixel of the image, at a reduced resolution relative to the printing step (300 dpi input image data (column 5, lines 22-27), 600 dpi print data (column 5, lines 16-21)).

6. Claims 1, 2, 4, 5, 10 and 29-31 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,315,391 (Kanematsu).

Regarding claim 1, Kanematsu discloses a method for printing an image, said method comprising: for at least each colorimetric level that will be found in rendering the image, defining plural different superpixels (noting Fig. 2, eight superpixels are defined for each of colorimetric levels 1-9 (column 5, lines 11-14)); generating or receiving data for the image (noting Fig. 1, image data originating at host 1000); rendering the image by a process that finds, for positions within the image: colorimetric levels (image data from host quantized prior to reception by print controller (column 5, lines 42-48)), and a randomized value corresponding to substantially each found colorimetric level (4-bit random number value read out from a random number sequence stored in random number storage unit (column 5, lines 60-67)); applying the randomized value to select a superpixel from the plural superpixels for each found colorimetric level (calculated remained of selected random number value used as an index number for selecting a dot pattern from matrix storage unit 1002 (column 6, lines 1-7)); and printing the image using the selected superpixels (data printed by ink-jet printer (column 5, lines 42-48)).

Regarding claim 2, the superpixels defined for each available colorimetric level are all colorimetrically equivalent (noting Fig. 2, all superpixels comprising one ink dot correspond to colorimetric level 2, all superpixels comprising two ink dots correspond to colorimetric level 3, all superpixels comprising three ink dots correspond to colorimetric level 4, etc.).

Regarding claim 4, the rendering step operates in a computational space that has: one dimension for each colorant available (first dimension corresponds to colorimetric levels); plus at least one dummy dimension which generates said

randomized value (second dimension corresponds to dot matrix pattern selected from matrix storage unit 1002 randomly (column 5, line 60 – column 6, line 7)).

Regarding claim 5, operation of the rendering step in the at least one dummy dimension comprises using at least one least-significant bit that: results from the rendering step in a colorant dimension, but is substantially decorrelated from the colorimetric levels found by the rendering step (dot matrix pattern selected corresponding to quantized data, based on 4-bit random number value (column 5, line 60 – column 6, lines 1-7). Because number value is random, there is no correlation between it and the colorimetric level).

Regarding claim 10, the image consists of color values in each of a large multiplicity of pixels (dot matrix patterns selected in units of colors yellow, magenta, cyan and black (column 6, lines 44-55)); said positions comprise substantially each pixel of the image, at a reduced resolution relative to the printing step (300x300 DPI image processed to form 1,200x600 DPI print data (column 5, lines 42-48)).

Regarding claim 29, Kanematsu discloses an apparatus for printing an image, said apparatus comprising: means for defining plural different superpixels for each available colorimetric level (noting Fig. 2, eight superpixels are defined for each of colorimetric levels 1-9 (column 5, lines 11-14)); means for generating or receiving data for the image (noting Fig. 1, image data originating at host 1000); means for rendering the image by a process that finds colorimetric levels for positions within the image (image data from host quantized prior to reception by print controller (column 5, lines 42-48)); means for generating or receiving a randomized value for each of the positions

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within the image (4-bit random number value read out from a random number sequence stored in random number storage unit (column 5, lines 60-67)); means for applying the randomized value, in common for all color planes, to select for each color plane a respective superpixel from the plural superpixels for the found colorimetric level (in second embodiment, respective superpixels selected for each color plane (column 7, lines 1-9)); and means for printing the image using the selected superpixels (data printed by ink-jet printer (column 5, lines 42-48)).

Regarding claim 30, the applying means comprise means for employing a randomized value which corresponds to a compatible set of superpixels for different color planes (in second embodiment, respective superpixels selected for each color plane (column 7, lines 1-9)).

Regarding claim 31, the compatible set of superpixels comprises coordinated placement of colorant quality in the different color planes to achieve a certain image-quality objected (prevention of dot patterns from being tuned among colors; elimination of density nonuniformity, strip patterns and pseudo edges resulting from tuning of dot patterns among colors (column 6, lines 44-50)).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.



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8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. as applied to claim 1 above, and further in view of Kanematsu.

Regarding claim 10, Tanaka et al. disclose a method wherein said positions comprise substantially each pixel of the image, at a reduced resolution relative to the printing step (input pixels at 300 dpi (column 5, lines 22-24), output pixels at 600 dpi (column 6, lines 15-24)).

Tanaka et al. do not disclose an image consisting of color values in each of a large multiplicity of images. However, this limitation is disclosed in Kanematsu, as mentioned above (dot matrix patterns selected in units of colors yellow, magenta, cyan and black (column 6, lines 44-55)). Providing color values for each pixel enables a user to print enhanced-resolution images in color, thereby enhancing the versatility of the invention disclosed by Tanaka et al., and thus it would have been obvious for one of ordinary skill in the art to modify the teaching of Tanaka et al. by provide dot matrix pattern selection in units of colors, as disclosed in Kanematsu.

***Allowable Subject Matter***

9. Claims 11-15 and 17-28 are allowed.

10. Claims 3, 6, 7, 32 and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Claim 16 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter: No prior art has been found to disclose or suggest superpixels defined for at least one colorimetric level varying in colorimetric value so as to express that colorimetric level, on average, as a nonintegral number of colorant quanta, as recited in dependent claims 3 and 33; or mapping a particular location in a matrix of random values to a particular position in the image, to choose a random number at said particular location in the matrix for selection of a superpixel to use at said particular position in the image, as recited in dependent claim 6 and base claim 11; or the step of controlling a defining or selecting of superpixels to impart a blue-noise property to the selected superpixels as an aggregate, as recited in base claim 25; or elimination of substantially all drop-on-drop placement across planes, within highlight regions of the image, as recited in dependent claim 32.

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,331,898 (Yokoi et al.) discloses storage of a plurality of density patterns corresponding to each density, and codes corresponding to the density patterns.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas D. Lee whose telephone number is (703) 305-4870. The examiner can normally be reached on Monday-Friday (7:30-5:00), alternate Fridays off.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on (703) 308-7452. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Thomas D. Lee  
Primary Examiner  
Art Unit 2624

tdl  
April 30, 2004